CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. R5-2008-XXXX
ISSUED TO THE
U.S. DEPARTMENT OF ENERGY
AND
LAWRENCE LIVERMORE NATIONAL SECURITY, LLC
FOR
LAWRENCE LIVERMORE NATIONAL LABORATORY
EXPERIMENTAL TEST SITE (SITE 300)
SEWAGE EVAPORATION AND PERCOLATION PONDS
SEPTIC SYSTEMS
COOLING TOWER DISCHARGES
MECHANICAL EQUIPMENT WASTEWATER DISCHARGES
AND
OTHER LOW-THREAT DISCHARGES

ALAMEDA AND SAN JOAQUIN COUNTIES

Lawrence Livermore National Laboratory Site 300 discharges domestic and wastewater to sewage evaporation and percolation ponds in the General Services Area, septic systems located throughout the site, and mechanical equipment wastewater and cooling tower blowdown to percolation pits and septic systems located throughout the site. Other low threat discharges described in Attachment 4 of Waste Discharge Requirements Order No. R5-2008-XXXX occur throughout the site.

This Monitoring and Reporting Program (MRP) is issued pursuant to Section 13267 of the California Water Code and is designed to determine if permitted wastewater discharges are impacting, or have the potential to impact, groundwater. The Discharger shall not implement any changes to this MRP unless and until a revised MRP is issued by the Executive Officer.

Prior to construction of any new groundwater monitoring wells, the Discharger shall submit plans and specifications to the Regional Water Board for review and approval. Once installed, all new wells shall be added to the monitoring program described below for the area in which they were installed.

SEWAGE EVAPORATION AND PERCOLATION PONDS

Effluent and Pond Monitoring

1. Effluent samples shall be collected just prior to discharge to the disposal facility (Location ISWP). The effluent waste stream shall be sampled and analyzed **semi-annually** for specific conductance (SC), pH, and biochemical oxygen demand (BOD). Table 1 lists analytical methods and reporting limits.

2. The sewage evaporation pond (Location ESWP) shall be sampled and analyzed **semi-annually** for the all analytes listed on Table 1. Table 1 lists analytical methods and reporting limits.

3 The sewage evaporation pond shall be observed **monthly** for freeboard, color, odor, and levee condition.

4. When discharge to the percolation pond (Location DSWP) occurs, the discharge shall be sampled for the all analytes listed on Table 1. Table 1 lists analytical methods and reporting limits.

Table 1. Sewage ponds wastewater and effluent analytes, analytical methods and reporting limits

Analyte	EPA (E) or Standard Method (SM)[1]	Reporting limit	Units
Specific conductance	E120.1 or calibrated field meter	Not applicable	µmhos/cm
pH	E150.1 or calibrated field meter	± 0.1	unitless
Metals	E200.7 or E200.8	Variable	mg/L
Dissolved oxygen	E 360.1 or calibrated field meter	0.05	mg/L
Biochemical oxygen demand	SM 5210B	2	mg/L
Total coliform	SM 9211	2	MPN/100mL
Fecal coliform	SM 9211	2	MPN/100mL

[1] Or equivalent method as approved by the Regional Water Board.

Groundwater Monitoring

5. Groundwater near and below the sewage evaporation and percolation ponds shall be sampled and analyzed **semi-annually** from upgradient wells W-7ES and W-7PS, crossgradient monitoring well W-35A-04, and downgradient monitoring wells W-26R-01, W-26R-03, W-26R-05, W-26R-11, W-25N-20, W-25N-23 and W-7DS (wells are shown on Attachment 8 of Waste Discharge Requirements Order No. R5-2008-XXXX) for the analytes listed on Table 2. Table 2 lists analytical methods and reporting limits.

6. Semi-annual sample collection shall be separated by at least 3 months and collected during periods that represent seasonally high and seasonally low ground water elevations.

Table 2. Sewage ponds groundwater analytes, analytical methods and reporting limits

Analyte	EPA (E) or Standard Method (SM)[1]	Reporting limit	Units
Specific conductance	E120.1 or calibrated field meter	Not applicable	µmhos/cm
pH	E150.1 or calibrated field meter	± 0.1	Unitless
Total coliform	SM 9211	2	MPN/100mL
Fecal coliform	SM 9211	2	MPN/100mL
Chloride	E300.0	0.5	mg/L
Nitrate as NO_3	E300.0, E354.1, or E353.2	0.5	mg/L
Sulfate	E300.0	1	mg/L
Total Dissolved Solids (TDS)	E160.1	1	mg/L
Sodium	E200.7	11	mg/L
Metals	E200.7 or E200.8	Variable	mg/L
Ground water elevation	Field measurement	Not applicable	Feet or Meters

[1] Or equivalent method as approved by the Regional Water Board.

SEPTIC SYSTEMS GROUNDWATER MONITORING

7. Groundwater near or downgradient of the septic systems at Buildings 812, 834, 850, and 899 shall be sampled and analyzed **semi-annually** from the wells specified in **Table 3** for nitrate as NO_3, total and fecal coliform, and groundwater elevation. **Table 4** lists the analytes, analytical methods and reporting limits.

8. Semi-annual sample collection shall be separated by at least 3 months and collected during periods that represent seasonally high and seasonally low ground water elevations.

Table 3. Groundwater monitoring wells for Buildings 812, 834, 850 and 899 septic systems

Septic system	Downgradient monitoring wells	Upgradient monitoring well
Building 812	W-812-07 W-812-09	W-812-1929
Building 834	W-834-S1 W-834-S4	W-834-D17
Building 850	NC7-61 NC7-10	W-850-2416
Building 899	K6-23[1]	K6-17

[1] No monitoring wells exist directly downgradient of the septic system at B899. K6-23 is located within 50 feet of the septic system and has historically yielded samples with high nitrate concentrations.

Table 4. Buildings 812, 834, 850, and 899 septic system groundwater analytical methods and reporting limits

Analyte	EPA (E) or Standard Method (SM)[1]	Reporting limit	Units
Nitrate as NO_3	E300.0, E354.1, or E353.2	0.5	mg/L
Total coliform	SM 9211	2	MPN/100mL
Fecal coliform	SM 9211	2	MPN/100mL
Ground water elevation	Field measurement	Not Applicable	Feet or Meters

[1] Or equivalent method as approved by the Regional Water Board.

PERCOLATION PIT INSPECTIONS

9. The Discharger shall inspect **quarterly** the five mechanical equipment percolation pits located at Buildings 806A, 827 A, C, D, and E. If standing water is visible during the quarterly inspection, the Discharger shall increase the inspection frequency to **monthly** until no standing water is visible.

10. The Discharger shall inspect **quarterly** the seven cooling tower percolation pits located at Buildings 801, 809, 812, 817A, 826, 827A, and 851. If standing water is visible during the quarterly inspection the Discharger shall increase the inspection frequency to **monthly** until no standing water is visible. The more frequent inspections are required at percolation pits with standing water in order to prevent overflow of the percolation pits.

COOLING TOWER BLOWDOWN EFFLUENT MONITORING

11. The Discharger shall **semi-annually** collect representative grab samples of blowdown discharges from each active cooling tower for the analytes shown in **Table 5**. Active cooling towers which discharge to percolation pits are located at Buildings 801, 809, 812, 817A, 826, 827A, and 851. Cooling towers which discharge to septic systems are located at Buildings 802, 825, 830, 833, 835, 834A, and 850.

12. The Discharge shall also record the total flow monthly blowdown flow from the cooling towers.

MECHANICAL EQUIPMENT DISCHARGE EFFLUENT MONITORING

13. The Discharger shall **semi-annually** collect representative composite samples of mechanical equipment discharges at Buildings 827 A, C, D, E and 806A for the analytes shown in **Table 5**. Composite samples shall be representative of the combined discharge to the percolation pit during a day of operation at each specified facility.

Table 5. Cooling tower and mechanical equipment effluent, analytical methods and reporting limits

Analyte	EPA (E) or Standard Method (SM)	Reporting limit	Units
Aluminum	E200.7 or E200.8	0.05	mg/L
Arsenic	E200.8	0.002	mg/L
Barium	E200.7 or E200.8	0.025	mg/L
Boron	E200.7	0.05	mg/L
Cadmium	E213.2 or E200.8	0.05	mg/L
Calcium	E200.7	0.5	mg/L
Chloride	E300.0	0.5	mg/L
Chromium	E218.2 or E200.8	0.001	mg/L
Chromium (VI)	E218.2 or E200.8	0.001	mg/L
Copper	E220.2 or E200.8	0.001	mg/L
Fluoride	E340.2	0.05	mg/L
Iron	E200.7	0.1	mg//L
Lead	E239.2 or E200.8	0.005	mg/L
Magnesium	E200.7	0.5	mg/ L
Manganese	E200.7 or E200.8	0.03	mg/L
Molybdenum	E200.7 or E200.8	0.025	mg/L
Nickel	E249.2 or E200.8	0.002	mg/L
Nitrate (as NO_3)	E300.0, E354.1, or E353.2	0.5	mg/L
pH (pH units)	E150.1 or calibrated meter	± 0.1	Unitless
Potassium	E200.7	1	mg/L
Selenium	E270.2 or E270.3 or E200.8	0.002	mg/L
Sodium	E200.7	11	mg/L
Specific conductance	E120.1 or calibrated meter	na	µmhos/cm
Sulfate	E300.0	1	mg/L
Total alkalinity (as $CaCO_3$)	E310.1	1	mg/L
Total dissolved solids (TDS)	E160.1	1	mg/L
Total hardness (as $CaCO_3$)	SM2320B	1	mg/L
Total phosphorus (as PO_4)	SM 4500-P or E365.4	0.05	mg/L
Vanadium	E200.7 or E200.8	0.020	mg/L
Zinc	E200.7 or E200.8	0.02	mg/L

REPORTING

14. In reporting all monitoring data, the Discharger shall arrange the data in tabular form so that the sampling location, sample type (e.g. effluent, groundwater, etc.), date, constituents, concentrations and units are readily discernible. The data shall be summarized in such a manner as to illustrate clearly the compliance with this Order. A

short discussion of the monitoring results, including notations of any water quality violations, shall precede the tabular data.

15. As required by the California Business and Professions Code Sections 6735, 7835, and 7835.1, all water monitoring reports shall be prepared under the direct supervision of a California Registered Professional Engineer or Geologist and signed by the registered professional.

16. The results of any monitoring done more frequently than required at the locations specified in the MRP also shall be reported to the Regional Water Board.

Semi-Annual Monitoring Reports

17. The Discharger shall submit semi-annual electronic data reports, which conform to the requirements of the California Code of Regulations, Title 23, Division 3, Chapter 30. The semi-annual reports shall be submitted electronically over the internet to the State Water Board Geotracker database system by the **1st day of the third month following the second and fourth calendar quarter (i.e. by 1 March and 1 September)** until such time as the Executive Officer determines that the reports are no longer necessary.

18. In addition, hardcopies of the semi-annual monitoring reports shall be submitted to the Regional Water Board by the **1st day of the third month following the second and fourth calendar quarter (i.e. by 1 March and 1 September)** until such time as the Executive Officer determines that the reports are no longer necessary**.** Each semi-annual report shall include the following minimum information:

    a. A narrative description of all preparatory, monitoring, sampling and analytical testing activities, including trends in the concentrations of pollutants, if applicable, groundwater elevations in the wells, and how and when samples were collected.

    b. The narrative shall be supported by field logs for each groundwater monitoring well documenting depth to groundwater; measuring point elevation (e.g. top of casing elevation), parameters measured before, during, and after purging; method of purging; calculation of the casing volume; and total volume of water purged.

    c. Groundwater contour maps for all groundwater zones, if applicable.

    d. A table showing well construction details such as well number, groundwater zone being monitored, coordinates (longitude and latitude), ground surface elevation, reference elevation, elevation of screen, elevation of bentonite, elevation of filter pack, and elevation of well bottom.

    e. A table showing historical lateral and vertical (if applicable) flow directions and gradients.

f. Cumulative data tables containing the water quality analytical results and depth to groundwater.

19. Copies of the laboratory analytical data reports shall be maintained by the Discharger and provided upon request to the Regional Water Board or its representatives.

Annual Monitoring Report

20. An annual report, which contains a summary of the data including tabular summaries of all monitoring data and graphical summaries of all groundwater monitoring data obtained during the previous year, shall be submitted to the Regional Water Board. The annual report may either be included in the submission of the second semi-annual report or as a separate report to be submitted to the Regional Water Board by **1 March of each year**. The report shall discuss the compliance record and corrective actions taken or planned which may be needed to bring the discharge into full compliance with the waste discharge requirements.

21. The Annual Report shall contain the following minimum information:

a. Tabular summaries of all data obtained during the year and graphical summaries of the last five years of data.

b. Groundwater elevation and chemical concentration contour maps.

c. An evaluation of the groundwater quality beneath and downgradient of each wastewater treatment facility.

d. An identification of any data gaps and potential deficiencies/redundancies in the monitoring system or reporting program.

e. If desired, a proposal and rationale for any revisions to the groundwater sampling plan frequency and/or list of analytes.

22. The Discharger shall implement the above monitoring program as of the date of the Order.

Ordered by:

PAMELA C. CREEDON, Executive Officer

(Date)